USAID: LEADERSHIP IN PUBLIC FINANCIAL MANAGEMENT

ETHIOPIA IFMIS ANALYSIS ASSESSMENT

FINAL REPORT

1 AUGUST 2011

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1. INTRODUCTION

The Government of Ethiopia has asked that the United States provide technical and financial assistance for their Ministry of Finance and Economic Development (MoFED) Integrated Financial Management Information System (IFMIS) Oracle implementation. Through this system implementation Ethiopia's stated goal is to: "support public bodies and regions to generate accurate, accessible, and timely government-wide financial information and reports which contribute to the improved quality of the nation's financial decision making".[1] IFMIS will replace the locally developed legacy Integrated Budget Expenditure System (IBEX) with a commercial off the shelf (COTS) solution, Oracle E-Business Suite.

By leveraging a globally recognized COTS solution the Government of Ethiopia hopes to achieve the following:

- Use Oracle's embedded best practices to help drive transformational benefits associated with financial management modernization and improvements.

- Deliver a financial management system that integrates MoFED across functional disciplines along with other Ethiopian Government systems and entities, such as the customs, transportation, and the banking sectors.

- Leverage a unified database across multiple organizations and geographies with efficient single data entry and ubiquitous data access throughout the Government.

- Use integrated built-in workflows and approval processes to support transparent and consistent financial management.

- Implement a system that eventually becomes the single source of federal financial information.

To achieve these objectives MoFED has commenced an initial 18 month Oracle implementation pilot program. Through a sole source solicitation process MoFED selected the Oracle E-Business Suite which is an internationally accepted COTS software application to effectively manage public financial information at the national and sub-national levels. At the macro level, the Oracle functionality meets Ethiopia's stated requirements and objectives. To assist with the implementation, MoFED contracted Transnational Computer Technology (TCT), a small business systems integrator based out of El Segundo, California with offices in Nigeria and Addis Ababa. As of July 2011 the IFMIS Project is in the ninth month of the overall 18 month implementation timeline. The over 80 staff assigned to the IFMIS Project Team is comprised of select ministry key users, MoFED project leadership, and supporting consultants from TCT. The team has completed the first of three Conference Room Pilots (CRPs) and is attempting to adhere to an aggressive implementation timeline. Comparative analysis with Oracle implementations of similar size and complexity reveals an ambitious timeline irrespective of any additional challenges such as limited infrastructure and potential impediments to Information Communications Technology (ICT) assimilation in Ethiopia.

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[1] Ministry of Finance and Economic Development Integrated Financial Management Information System Program Document November, 2010.

2. EXECUTIVE SUMMARY

The Government of Ethiopia and MoFED have embarked on an ambitious plan to integrate and modernize their current IBEX Financial Management Information System by implementing Oracle for the IFMIS application. The selection of the Oracle E-Business Suite is a sound functional decision based on Ethiopia's Public Financial Management (PFM) requirements, goals, and objectives. Despite an industrious and capable MoFED IFMIS Project Team, several key challenges exist. Broader strategic issues beyond the purview of the MoFED IFMIS Team need to be addressed in order to effectively enable the Oracle IFMIS implementation:

- Ethiopia's comparatively underperforming ICT infrastructure places considerable systemic constraints on a real-time integrated IFMIS. Reliability, security, and overall system integrity are a concern for a system hosted and supported on Ethiopia's nascent ICT infrastructure.

- ICT assimilation in the public sector has limitations. While Ethiopia possesses a strong but relatively small core of technology savvy professionals, sufficient human capacity does not appear to scale to the demands of 1200 planned IFMIS locations within the next 5 years. For example, the legacy IBEX system in operation for nearly a decade has not been adopted at several sub-national locations and illustrates either capacity limitations or resistance to automation.

While these two challenges are considerable they are not insurmountable. Key implementation strategies can be employed to mitigate performance risk and improve the probability of implementation success. Currently, eight Oracle modules are scheduled for implementation across nine ministries and regional locations within an aggressive 18 month implementation timeline. While Ethiopia has an admirable sense of urgency, the implementation timeline should be scaled to organizational absorption capacity as certain outcome-based training milestones are achieved, aligned to the complexity and level of effort necessary to resolve key technical application issues (customizations and modifications), and modulated by the presence of sufficient and reliable ICT infrastructure. Our report identifies potential improvement areas such as changes to the architectural design to help improve system reliability and amendments to functional recommendations that can streamline current business processes and better leverage Oracle's native capabilities.

Our report evaluates the Oracle IFMIS implementation through two lenses. First, we analyze the interrelationship between strategy, people, process, and technology as they impact and influence the MoFED IFMIS implementation. Oracle is a proven technology that has been successfully implemented globally in both the public and private sectors. Strategy, people, process, and technology are the key variables that have the greatest influence on implementation success or failure; therefore our report takes a balanced approach to address each of these areas.

The assessment team is optimistic because the MoFED IFMIS Team is addressing all four of these areas. For example, they are using the Oracle AIM for Business Flows which is a widely accepted integration approach and a positive indicator of project design/build process control. While strategy, people, process, and technology are being addressed, there are a host of opportunities for continuous improvement. In these areas, our report leverages Deloitte's Enterprise Value Delivery (EVD) which represents lessons learned, project accelerators, and

improvement approaches drawn from over 1,000 successful Oracle implementations. Our report includes time-tested and data driven recommendations from our EVD project repository. For example, MoFED plans to use a modified cash-basis accounting system in parallel with accrual accounting. While technically possible in Oracle, our analysis recommends a decisive move to accrual accounting to reduce configuration complexity and provide one consistent modernized process for the Ethiopian Government.

3. OPPORTUNITIES FOR TECHNICAL ASSISTANCE

Based on the information collected at the MoFED, the Deloitte assessment team believes that the IFMIS risks identified above and throughout this report can be mitigated and that USAID/Ethiopia is well positioned to provide cost effective support of the GoE's financial reforms. A modest USAID/Ethiopia foundational investment in the IFMIS will significantly reduce implementation risk and improve the likelihood of overall program success.   Before any support and technical assistance is provided, MoFED should furnish current IFMIS financial status and variances against planned expenditures. The majority of our technical assistance recommendations have a low delivery risk and, with the exception of the training support, the assistance is comprised of a relatively limited level of short term technical assistance. The core IFMIS team can greatly benefit from targeted technical assistance to augment areas where current capacity is limited.

STRATEGY AND GOVERNANCE

During the course of the assessment, the team found that there was strong top-down leadership advocacy for IFMIS throughout the Government of Ethiopia. This financial, political, and popular support will be essential to driving the implementation to completion. However, it is unclear whether MoFED has a sound understanding of IFMIS implementation details, or if the organization has a senior architect/advisor who can integrate and coordinate all of the disparate MoFED public financial management initiatives that impact IFMIS.

The IFMIS implementation must align clearly with Ethiopia's E-Government strategy[2] stating:

- E-Government is focused on creating a SMART (Simple, Moral, Accountable, Responsive, and Transparent) Government;
- E-Government promotes causes of e-citizen and e-democracy;
- E-Government is not translating processes, it is transforming processes;
- E-Government necessitates Capacity building within the Government;
- E-Government promotes networked and integrated government;
- E-Government is citizen-centric;
- E-Government provides multi-channel delivery of public services;

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[2] Ethiopia Ministry of Communication and Information Technology E-Government Strategy; May, 2011.

- E-Government aims to provide convenient access of information to all, and to improve service access and delivery;
- E-Government enables development and participation of all segments of the population to reap the benefits of IT and also to participate in the Governance process and be able to voice their opinions more effectively; and
- E-Government supports the development and inclusion of Private Sector in public service delivery.

Figure 1.0 depicts the governance structure and target audience for the 18 month IFMIS pilot implementation. There appears to be appropriate organizational alignment to support GoE strategic objectives:

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                    │ National Task    │
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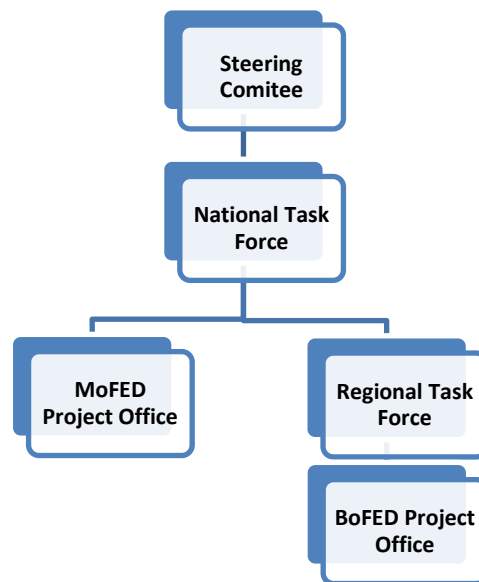
The following are baseline strategy and governance assumptions as of July 30, 2011:

- The pilot Implementation will be completed in the allotted time (by February 2012).

- Resource Management (Human and Financial) should be concurrently implemented to maximize the integrated strength of Oracle and reduce costs of separately implemented modules.

- A National Task Force should be established to organize the national rollout project.

- A strong project management unit will exist in each implementation region.

- All deployment sites will provide LAN services to their subordinate organizations.

- All deployment sites will establish connectivity to the internet/WaredaNet in accordance with the current IFMIS implementation timeline.

- Ethiopia Telecom will proactively engage MoFED and the IFMIS to sufficiently provision WaredaNet/Internet connectivity to deployment sites (last mile connectivity).

- A National Task Force is formed and comprised of technical expertise from EthiopiaTelecom, MoCIT, INSA, MoFED and other stakeholders.

- Regional Task Forces are established and comprised of technical/operational personnel from Regional Branch Telecom, Regional Administrative Office, Bureau of Civil Service (WaredaNet + Regional Datacenter), BoFED and other stakeholders.

PUBLIC FINANCIAL MANAGEMENT THROUGH IFMIS

The new system will provide MoFED with Public Financial Management based on modified cash basis accounting with an aim to move to an accrual based accounting. The system implementation may be hindered by the limited population of trained accountants (estimated by the World Bank to be less than 400 available).

For the Ethiopian MoFED to transition from line item budgeting to performance budgeting will require program budgeting module readiness by February 2012 to coincide with the FY2005 budget preparation timeline.

The Initial assessment included a review of the following eight areas related to the GoE's financial management practices:

1. General Ledger, Account Payables
2. Account Receivables (AR) and Cash Management
3. Public Sector Budgeting (PSB)
4. Procurement and Inventory
5. Asset Management (Fixed Assets & General Services)
6. Payroll
7. Human Resources (Functionality for Payroll ONLY)

The General Ledger needs to be localized to address the unique accounting requirements for Ethiopia. This includes the seven year delayed fiscal calendar (Ethiopia is currently practicing and observing 2004 year in 2011 calendar year), the observed 13 month calendar, and the currency translation. Additionally, the budget and periodic financial reports require multiyear planning following an Ethiopian standard calendar year medium Term Expenditure Framework, which will also be included in the General Ledger.

Observations:

- In Wareda some sector offices (such as Court, Police, House of Speakers, and Health Stations) perform their accounting and financial transactions using their own bank accounts which is unlike other offices whose accounting is processed by the single bank account, WoFED. These exceptional Wareda level offices merge into IFMIS, therefore complicating the usually simple data migration method.
- Some institutions perform different functions which are financed directly by the region; therefore they report their budgets and expenditures directly to the respective region. The team has yet to identify how these institutions will be treated with General Ledger.
- Bank account transfers between two ministries or public bodies have not yet been addressed.

- Various categories such as invoicing, credit memos, payments, and ordering segments did not have an identified purpose within General Ledger.
- The team has yet to identify the budget borrow transaction and approval resource for the coming fiscal year.
- For several regions, the reconciliation and adjustments process for General Ledger is quite lengthy, therefore there is a risk that this process will be conducted at the same time that transactions for the new fiscal year are being created.
- The project team has yet to delineate responsibilities between General Ledger and Public Sector Budgeting; including budget control and supplementary budget control.
- There is a lack of understanding from the project team in regards to the functions of General Ledger and how those functions support accounting processes.
- The project team has yet to identify a repository to store the branches of an Ethiopian Revenues and Customs Authority (ERCA) data.
- Within ERA (Ethiopian Roads Authority) several projects are implemented every year addressing ERA specific requirements. The IFMIS is a centralized system, which may create an inconvenience for ERA operations.
- A single source of funds may use different bank accounts within IFMIS; therefore the bank wise financial reports generation will be complex. The project team should define a bank account code which corresponds to each bank account.

GL RECOMMENDATIONS:

- Deloitte recommends that responsibilities be defined between PSB and GL. For example; PSB rather than GL will handle all budget and supplementary budget controls.
- Deloitte recommends that all reporting (financial, operational, etc.) requirements be revisited and agreed upon by the project team. All requirements should be validated against the functionality of GL to ensure that all reports capture the desired information.
- Given the differences (in accounting practices, observed calendars, reporting, currencies, budgeting activities, etc.) across institutions, regions, Waredas, and Public Bodies, Deloitte recommends that GL be used to capture and automate as much of those differences as possible.
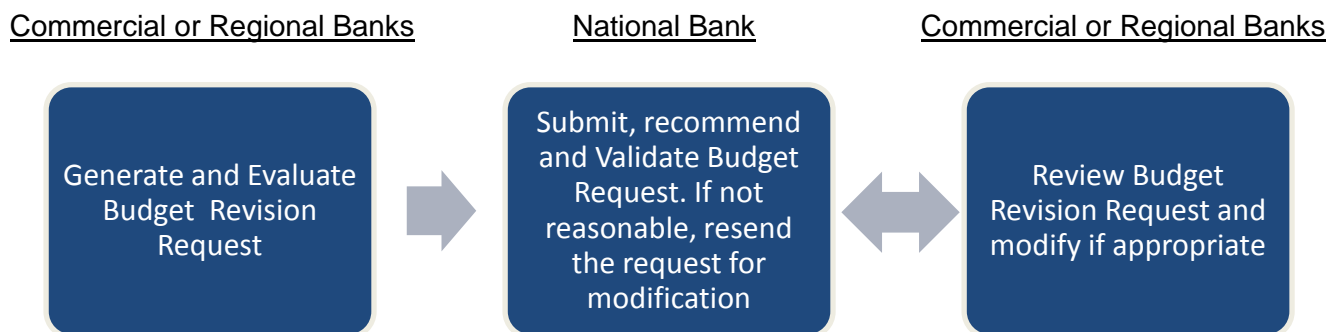
AR AND CR RECOMMENDATIONS:

- Deloitte recommends that MoFED's new system, IFMIS, should identify and automate ordering, receipt, invoice, and payment records which are currently entered using manual processes.
- Deloitte recommends that IFMIS ordering, payment, and invoicing process be integrated with image processing systems in order to reduce the manual processes and eliminate the risk of fraud.
- Deloitte recommends that business rules be appropriately defined and tracked in case any out of scope issues arise in the future.
- Deloitte recommends that the project team revisit requirements in order to identify areas where customization will be required. Customizations should be documented and thoroughly defined in order to be built within AR.

PUBLIC SECTOR BUDGETING

According to the MoFED team, each year there exist variances in the actual versus estimation budget. The variances are neither analyzed nor explained in detail in the budgetary reports or financial statements. The budget requests and submissions also do not include detailed explanatory narratives to justify budget requests, thereby making it difficult to plan expenditures or clearly understand policy priorities, specific activities, and goals and objectives for the budget year. The detailed financial activity report needs to be identified for federal, regional, and Wareda levels in IFMIS.

Figure 1.1 outlines the high level program budgeting process:

Commercial or Regional Banks	National Bank	Commercial or Regional Banks
Generate and Evaluate Budget Revision Request	Submit, recommend and Validate Budget Request. If not reasonable, resend the request for modification	Review Budget Revision Request and modify if appropriate

Observations:

- Fund check level for Federal, regional, and Wareda level shall be absolute.
- Budget Year type multiyear budget proposal and monthly budget distribution for all ministries are included in the requirements. However, this requirement is only feasible if the prior multiyear budget has been allocated.
- The present PSB budget transactions like budget subsidies, government debt settlement, contingency, etc. are handled by MoFED/BoFED/ZoFED/WoFED. Internet connections and sufficient network connectivity are not available within a few zones and Waredas, so the locally handled financial transactions will be a challenge for IFMIS application.
- Non-financial reports like work plans, performance data, etc. have not been identified. They may be required by a few ministries for employee performance, promotion, bonuses, etc.

Recommendations:

- Monthly or quarterly management performance meetings are critical to the financial program and IFMIS system. Detailed records (minutes) of these meetings should be prepared and distributed to ensure wide understanding of issues that are discussed and steps to be taken to address them. We recommended MoFED coordination and top level

management meetings be structured with systematic and follow-up actions clearly recorded.

- Several issues are still open in the issue tracker. These issues must be identified and documented to determine if they are out of scope of the IFMIS project.
- We recommend MoFED develop procedures for costing program activities in a standard and effective way across all government sectors in federal, regional, and Wareda. This standardization would be accompanied by extensive training to ensure understanding across all implementing staff.
- To reduce the potential reporting burden at the regional level, we recommend MoFED review current reporting requirements to develop a process to streamline reporting requirements that can be utilized to meet the needs of various donor and government agencies. Leading practices in financial reporting should be considered for implementation to ensure reports that:
  o Minimize the development of additional financial reports;
  o Align periodic reporting with government's normal reporting cycle; and
  o Consistently use the current and the most up to date chart of accounts to record activities.
- The IFMIS is the backbone of the budget linkage between the various Government agencies. However, it has been in a pilot stage, and some more additional modules have yet to be implemented, leaving the staff in a transitional state requiring both "Excel-type" record keeping and IFMIS. The regional offices often lack reliable internet connectivity with IFMIS, which significantly limits IFMIS's use at that level or requires time-consuming travel to Wareda locations to perform critical web based online system data entry.

PROCUREMENT AND INVENTORY MANAGEMENT

The assessment team requested MoFED procurement staff to provide a sample of procurement evaluation reports, but none were provided. That said, we observed that some MoFED procurement staff members had no professional development training beyond the initial new hire training. Procurement staff at MoFED and the regional staff indicated that additional training in EBS procurement would be beneficial and helpful in supporting the IFMIS application. Furthermore, the lack of back-up resources will delay the procurement testing module for EBS suite IFMIS application.

The Oracle eAM uses templates, associated with Asset Groups, to store asset attributes and asset-related information. Top-level asset requirements should be defined for MoFED's office building in the IFMIS application. Child assets should also be defined for each individual floor of the building. Currently, no strategy or approach documentation exists to store Assets.

Observations:

- Deloitte's team noticed that all critical and minor issues in the issue log were marked as "Not in Current Scope" for Procurement and Inventory section. Also we noticed that no requirement document exists for Procurement.
- There is a lack of technical resources to support the Procurement and Inventory module, and the module itself has not been properly configured in IFMIS application. Usually the procurement module is quite robust and covers all aspects of public procurement at all

levels of government in the R12 version of Oracle being implemented. There are clearly prescribed procurement procedures, best practices, and guidelines available in the R12 version including sample formatting of contract documents.

Recommendations:

- Deloitte recommends that MoFED identify procurement appropriate requirements, and design and implement those in the IFMIS single system.
- The MoFED selected procurement team should attend special training with Oracle on new R12 rules and regulations.
- All ministries should implement the consolidated procurement module for the IFMIS application.
- Deloitte also recommends that backup resources be identified and properly trained in Oracle EBS R12 to ensure continuity of procurement work when the primary employee is out of the office.
- Deloitte recommends MoFED implement an asset management process to include the periodic inventory of assets. Given staff limitations, staff assigned inventory responsibilities may need to be supplemented by contractors hired for that purpose. Good asset management planning must compliment an organization's strategic or business planning. This will require:
  - Understanding the current asset base;
  - Determining which assets underpin current and future needs; and
- Deciding a course of action for future asset acquisitions, disposals and maintenance

CYBER SECURITY

- As IFMIS becomes increasingly integrated across the GoE, the National Bank and commercial banks cyber security threats are compounded. The current government network is only virtually separated from public internet traffic on the Ethiopia Telecom network backbone. IFMIS and the broader GoE network are at an increasing risk of exploitation, data loss, and denial of service. ***We recommend a multi-tiered cyber security improvement plan that addresses logical, physical, and virtual vulnerabilities to protect GoE's network and financial system. A short term network security specialist coupled with an Oracle application security specialist can identify and help initiate the essential cyber security countermeasures.***

MANAGEMENT CONTROLS AND HUMAN CAPACITY DEVELOPMENT

Stakeholder and government leadership buy-in and support are absolutely paramount in order to maintain the implementation timeline and execute the IFMIS to complete the integration. There are 100 ministry staff members identified for Unit Acceptance Test (UAT). At the core of the implementation are the IFMIS MoFED project team and the TCT project consultants. 85 key users embedded in the core IFMIS project team are responsible for identifying their ministries' detailed business requirements and are the authors of the system test scripts.

The project implementation estimates 1030 end users. Of this group, 400 to 700 will require ICT remedial skills training to be provided by TCT consultants (note there is a gap in the contract which only includes 300 remedial trainings). Consultant knowledge transfer will be an essential component to this process and the proposed one month post-production support is insufficient to meet transition requirements. A minimum of nine months of embedded technical support is recommended.

Absorption capacity of the pilot and broader ministries is a challenge due to current levels of computer literacy, limitations of the current IFMIS training plan, and high turnover/retention issues for civil service workers.

- Presently, MoFED has only limited internal controls designed and implemented through IBEX to prevent or detect misappropriation of assets and fraudulent financial reporting. The Oracle IFMIS solution offers a wealth of built-in system validations and error checking to promote transparency. Interviews with World Bank officials revealed a very limited number of professional accountants and qualified public financial managers who could effectively leverage the financial best practices embedded in the Oracle IFMIS solution. Additionally, we were unable to identify a strong linkage between the IFMIS implementation and MoFED's internal audit function to perform system reviews and validate controls. ***We recommend authoring a concise, communicated, and enforced internal controls process designed in IFMIS to help promote transparency and minimize misappropriation of MoFED assets and inaccurate financial reporting. In addition to authoring the necessary internal controls manual, accounting and public financial management training is necessary prior to the IFMIS go-live implementation in 2012. Online distance learning supported by intermittent instructor-led training sessions is a proven and cost-effective delivery method for adult learners. Our team validated that this is a successful learning approach currently used at Addis Ababa University in partnership with US-based universities.***

- Due to capacity limitations, personnel in key positions such as finance, accounting, and the National Data Center reportedly do not take annual leave. In addition, certain key positions are not rotated. For example, at one of the Data Centers, we were informed that a staff member had not taken leave for a few years. At all the sites visited, personnel cited lack of back-up resources due to a shortage of staff as the primary reason why annual leave was not taken. ***We recommend a workforce management plan to identify the required human resources to effectively and accurately operate IFMIS. The plan needs to include both core functional financial management professionals and supporting technical staff (infrastructure and applications).***

- Currently the Oracle Human Resources (HR) module is only being used to process GoE payroll. The GoE Ministry of Civil Service is the executive sponsor for human resource/civil service resource management and to date has been disengaged from the IFMIS implementation. The 18 month pilot and subsequent full scale roll-out presents a cost-effective opportunity to implement comprehensive HR functionality. ***We recommend full implementation of human resources and integrated payroll functions that will reduce the risk of manipulation of the payroll master records. Deloitte also recommends MoFED perform an independent review of the head count report to ensure the***

integrity of the payroll master records. We also recommend that MoFED perform a review of the personnel files to ensure that all personnel-related actions are filed. All information related to an employee--such as Oracle EBS or Project Management training, evaluations, leave requests, and salary withholding should be filed in the individual employee's personnel file. A checklist can be placed in each file to assist in ensuring that all documents are filed in the personnel file. Additionally, we recommend MoFED implement a time management system to track and approve employee attendance or absence. Time and attendance records should be automated and integrated with IFMIS and the payroll system so that actual performance in the field is reported on a daily basis as soon as practical. Leading practices to consider for implementing this recommendation include the following:

a. *Personnel database and payroll are directly liNked to ensure data consistency and monthly reconciliation.*
b. *Required changes to personnel records and payroll are updated monthly, generally in time for the following month's payments.*
c. *Authority to change records and payroll is restricted and results in an audit trail.*
d. *A strong IFMIS system of annual payroll audits will identify control weaknesses and/or ghost workers.*

IMPLEMENTATION RISK MANAGEMENT AND MITIGATION

MoFED's senior management needs to continue to develop processes to ensure adequate and effective risk management throughout the entity, and to conduct regular and systematic evaluation of the effectiveness of the entity's risk management system. We recommend a range of tools to use in risk identification that may include executive milestone review sessions, specifically designed risk identification forms, surveys, and questionnaires. We also suggest conferring with the Chief Internal Audit division of MoFED to assist with risk assessment process development.

- Our project issue resolution analysis revealed that the IFMIS team is solving the majority of technical problems in a timely manner. The issue log needs to be kept current and should be regularly audited/reviewed at a minimum on a quarterly basis. There are concerns that the most substantive technical issues (e.g. modifications to the performance based budgeting process) are pushed out to Conference Room Pilot 3. Challenging integration issues should be resolved at the earliest opportunity. Complex issues deferred to the final Conference Room Pilot often result in go-live delays. The IFMIS project which is in the ninth month of the 18 month pilot timeline is delayed by approximately two months. *We recommend that MoFED initiates a more comprehensive IFMIS tracking system to document partial deliveries and out of scope issues, ensuring that those items not yet delivered are not forgotten.*

Figure 1.3 enumerates the issues by category:

Status Category	AP/FA	AR/ CE	SCM	GL	PSB	Payroll
Customization	4	1	12	1	7	2
Out of Scope	1	2	3	3	1	N/A
Workaround	5	2	N/A	2	1	N/A
Change Management	4	1	6	1	2	2
Closed Issues	107	38	30	95	8	75

ICT INFRASTRUCTURE

- IFMIS will eventually serve as Ethiopia's integrated single-source of financial data that operates on the country's ICT backbone. Since the first 18 months of the project represents a limited scope pilot, full regional connectivity is not necessary. Although IBEX has been operating for nearly a decade, regional and local Wareda offices still lack reliable internet connectivity with IBEX and will present similar challenges to IFMIS. Additionally, IBEX faced adoption and scaling challenges when it moved from a pilot to a country-wide system. *We recommend a detailed architectural and infrastructure review of all IFMIS related Regional Data Centers (RDC) and regional network systems to identify the detailed technical requirements for IFMIS implementation and roll-out beyond the Addis Ababa metropolitan area network (MAN). Three technical advisors can complete this task in 2-3 weeks and would provide valuable inputs for a quarterly risk review. Key outputs are a negotiated Memoranda of Agreement (MOA) and Service Level Agreement (SLA) with Ethiopia Telecom along with a multi-year infrastructure improvement plan that realistically supports IFMIS expansion to the regions.*

- The National Data Center (NDC) is currently the primary hosting facility for IFMIS with MoFED serving as the back-up Disaster Recovery (DR) and Continuity of Operations (COOP) site. *Per industry best practices and similar to how Ethiopia's National Bank is supported by the NDC, we recommend that MoFED serves as the primary hosting facility for IFMIS. Active and passive physical security measures need to be either improved or implemented at both MoFED and NDC. We also strongly recommend implementing Oracle's Dataguard to prevent loss of critical GoE financial data. Current hardware configurations and system architecture are inadequate to support a reliable and redundant financial management system. A short-term datacenter planning, design, and review team can quickly develop an upgrade program to address secure data storage and management.*

- The National Data Center (NDC) is the primary application hosting site with MoFED as the back-up/disaster recovery site. The NDC currently lacks adequate application support and security. The primary application management site should be located in MoFED to provide better organizational alignment and to facilitate more responsive operations and support (the

National Bank back-up site is located at the NDC). The below issues are not sufficiently addressed in the National Data Center infrastructure, servers, and equipment:

- Power and Cooling.
- Business Continuity/Disaster Recovery
- Security & Cyber Security
- Ethiopian Governance, Risk and Compliance
- Virtualization
- Blade Servers
- Automation
- Network
- IT Infrastructure

Power and Cooling: When the electrical power failed throughout Addis Ababa, the backup UPS systems did not effectively operate for uninterrupted power supply to the systems at MoFED. Within the National Data Center room there is not enough cooling capacity to support the database and application servers. The backup UPS servers are also not adequate to provide the uninterrupted power to the data center.

Security and Cyber Security: Even though the National Data Center is located near the PMO office, it is not logically and physically secure enough. The IFMIS is a web based application, so more enhanced security procedures are needed to protect the system from Cybercrimes.

Virtualization: The IFMIS application will consolidate various Ministries' data and allow for future growth in the database. The server virtualization technology will reduce the size and improve all major components, including servers, SAN, networks, and applications within National Data Center.

Blade Servers: The IFMIS Blade Servers will enable a more financially smart and sensitive application in the National Data Center. The Blade servers will occupy less space in the floor and consume less power in the data center. The Blade Servers will be an attractive alternative to traditional deployments of rack-optimized servers.

Automation: The IFMIS applications, physical database and application servers, logical servers, data storage SAN, networks, and virtualization processes all become very complex at the National Data Center. In long term the server slowness, service level agreements (SLAs) budgetary requirements, automated backups and IT management will be more complex in the data center. The standard automation process will reduce the redundant tasks and processes. The BPM suites, discovery tools, self-healing systems and IT management standards tools will reduce the cost and risk of the National data center.

Network: The IFMIS must identify the users who will be accessing the systems. Where applicable, bandwidth constraints due to availability of physical infrastructure, carrier limitations or any other external factor beyond MoFED control have been noted. Citrix and Riverbed should

be used to enable delivery of application services to sites where bandwidth is a constraint. Riverbed boxes help to accelerate the WAN connectivity and have been leveraged to use IFMIS time entry system over satellite links. MoFED satellite link connectivity will be controlled by ETC (Ethiopian Telecom Corporation). All ERP data transmissions need to be secured via SSL. Special data encryptions need to consider for the security of the IFMIS application.

The current disaster recovery approach is based upon cold backups taken to tape and restoration from the tape backups at the MoFED backup location. The disaster recovery service provided by HP is a subscription based service, so there is no dedicated hardware. The required hardware and VPN connection are made available when needed for disaster recovery. An ignite image is used to jumpstart the restore process. The restore process and time is also dependent upon the physical delivery of the offsite tapes from the MoFED backup location. Physical hard disk parts also need to come from Dubai to Ethiopia, often taking more than three business days.

Under the present system, the application and database restoration time in a crisis situation will be more than three business days. The IFMIS is single system and several ministries' data will be stored in it. The contingency plan will resolve the long outage issues. MoFED will be the single system and backbone for Ethiopia Government recovery. Contingency plans need to be tested before full production deployment.

Hosting Provider	Application Name	Recovery Time	How is MAA achieved?
HP	IFMIS	72 Hour recovery time	Maximum availability will be achieved by implementing RAC + Dataguard Architecture
Current	IBEX	IBEX	No DR other than recovery from tape.

IFMIS ARCHITECTURE

The current state architecture consists of Database, EBS suite Application, and client threeTier Architecture. The Business logic is stored in the EBS suite whereas the data is stored in the Database. The present System Architecture consists of a High Available Architecture (HAA = RAC) configuration, which is not suitable for the single financial system in crisis situations, whereas the System Architecture with Maximum Available Architecture (RAC + Dataguard) data will be available 24*7 for all situations. The availability and uptime of the MAA will be much better than that of the HAA.
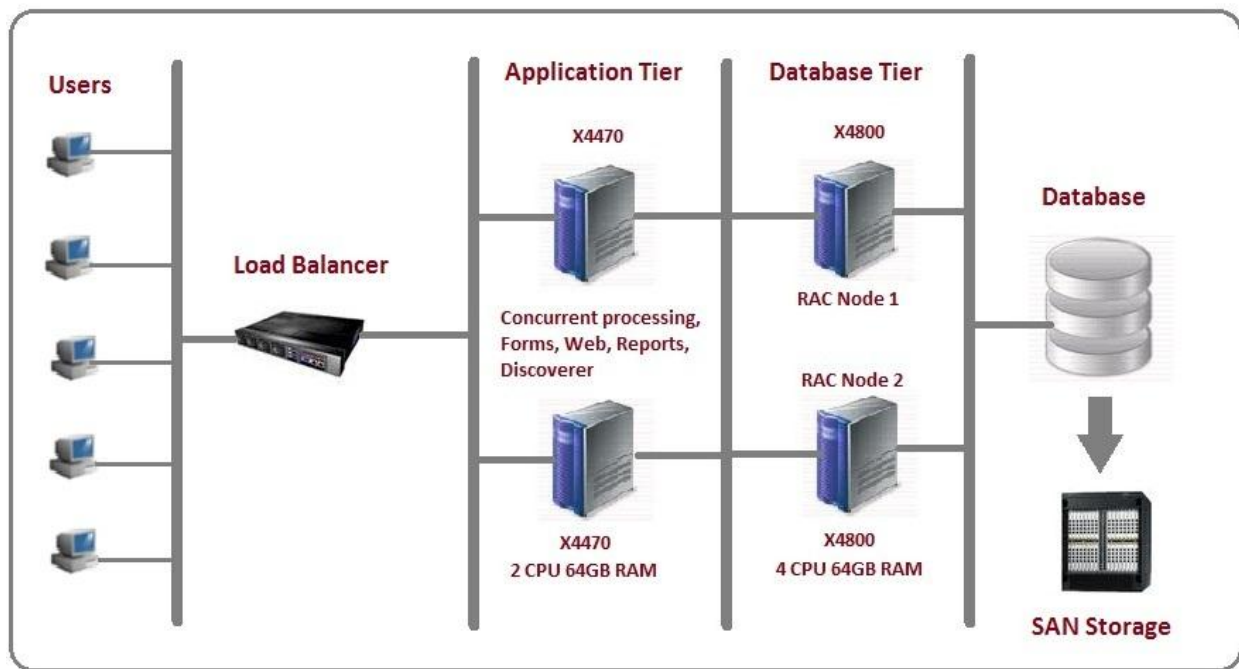
Database Tier: The database 11g Release 2.0 is currently being used for the IFMIS application. Note that in the chart above, database server Memory and CPU power is not mentioned. A powerful server is required to process multiple requests. Deloitte recommends the use of Dataguard contingency server configuration for the High availability RAC servers.

Application Tier: The application servers form the middle tier between the database and desktop clients. These servers will provide business logic and other functionalities for all modules. Deloitte also recommends a contingency design plan.

Concurrent Processing Servers: Processes that run on the concurrent processing server are called concurrent programs, and they operate in the background while users continue to work on other tasks. More than one server configuration is recommended to achieve parallel concurrent processing potential. The parallel concurrent processing will distribute the load and provide fault tolerance in case one of the servers fails.

Applications and Data Archive: The data volume growing at a high rate increases SAN utilization costs while high volumes of unused data lead to performance issues in the database. Appropriate archiving strategies need to be implemented for Oracle ERP IFMIS. Although a strategy exists, it never implemented in present IBEX systems. Moving forward, we expect archiving to be enabled and implemented in the new Oracle IFMIS system. The application or database archive strategy will significantly improve system performance.

Data retention requirements are based on the type of data to be retained and are being set by the Business Knowledge and Content Management (KCM) group. The MoFED team needs to identify the data retention policy for each ministry.

OPERATIONS AND MAINTENANCE:

Since the initial assessment was completed, the Deloitte team has made the following suggestions to improve future operations and maintenance for IFMIS:

Operational Issues: The current state architecture is a High Available Architecture (RAC) configuration. It consists of all ministries' workload environments with minimal IT-control and very few records of development data. The system is now interacting with key users, testers and developers, however currently performance test and test scenarios not yet been created. Unexpected database volume growth may arise causing performance issues to the application.

- **Recommendations:** Deloitte recommends Maximum Availability Architecture (RAC+ Data guard) configuration for the IFMIS application. We also recommend full load testing prior to production deployment as well as database growth estimation with capacity planning.

Lack of Environmental Controls: The current state environment is not audit-compliant with E-Governance standards, causing high risk exposure for the MoFED financials. Unanticipated changes in IFMIS growth may lead to capacity planning complexities.

- **Recommendations:** Deloitte recommends the IFMIS data should be audited. The database audit will identify unauthorized user activities in the database and provide accountability and identification of all connections to the database.

Future Proactive Database and Application Monitoring: Database and application performance issues are critical in the Oracle EBS production environment. A proactive approach from the development stage methodology will identify the locking, deadlocks, and mandatory pause events in the database as well as in the application.

- **Recommendations:** Deloitte recommends proactively monitoring database and application to identify all the issues in the database, forms, report servers, concurrent manager, and web servers. The tools like OEM, Toad, Foglight and Quest software will monitor the databases and applications.

APPENDIX

The distribution of application and database servers is based on a number of factors including network bandwidth between users and the primary data center or hosting facility. The National Data Center will house the primary data and applications server while Ministry of Finance and Economic Development (MoFED) data center will be the backup site.

NATIONAL DATA CENTER ENVIRONMENT

The characteristics of the architecture are:
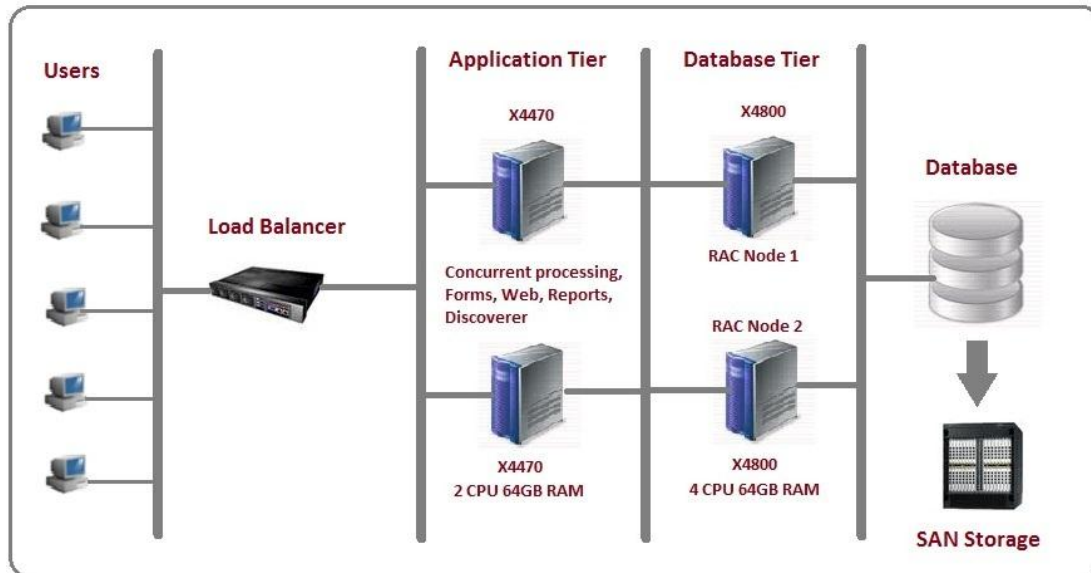
MoFED BACKUP DATA CENTER ENVIRONMENT
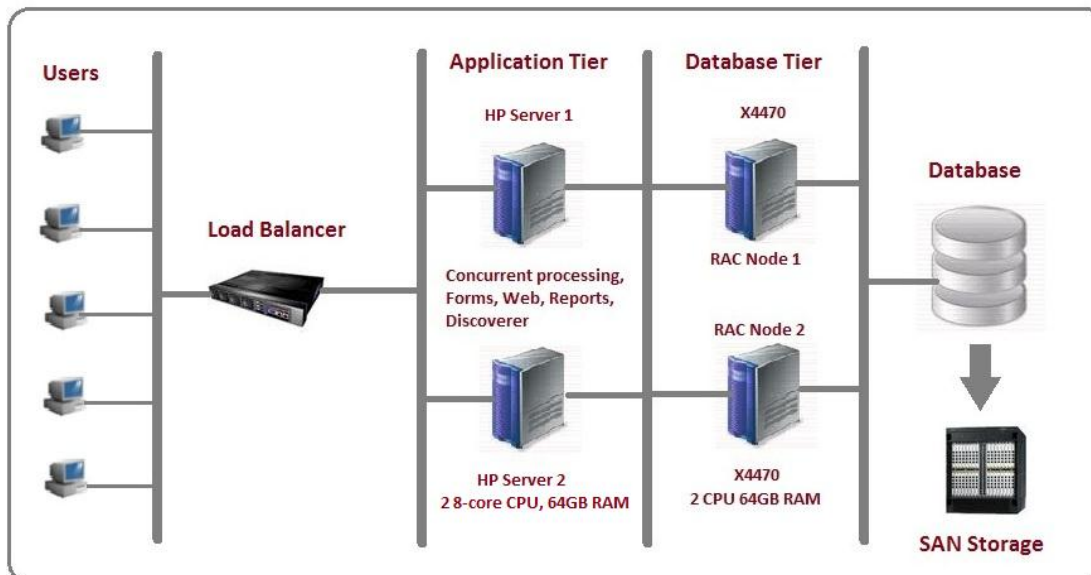
REGIONAL DATA CENTER

The **Regional Data Center** hosts the application and data servers which support that particular region. The Bureau of Finance and Economic Development (**BoFED**) data center act as the backup for their respective Regional Data Center.

OROMIA PRIMARY DATA CENTER ENVIRONMENT
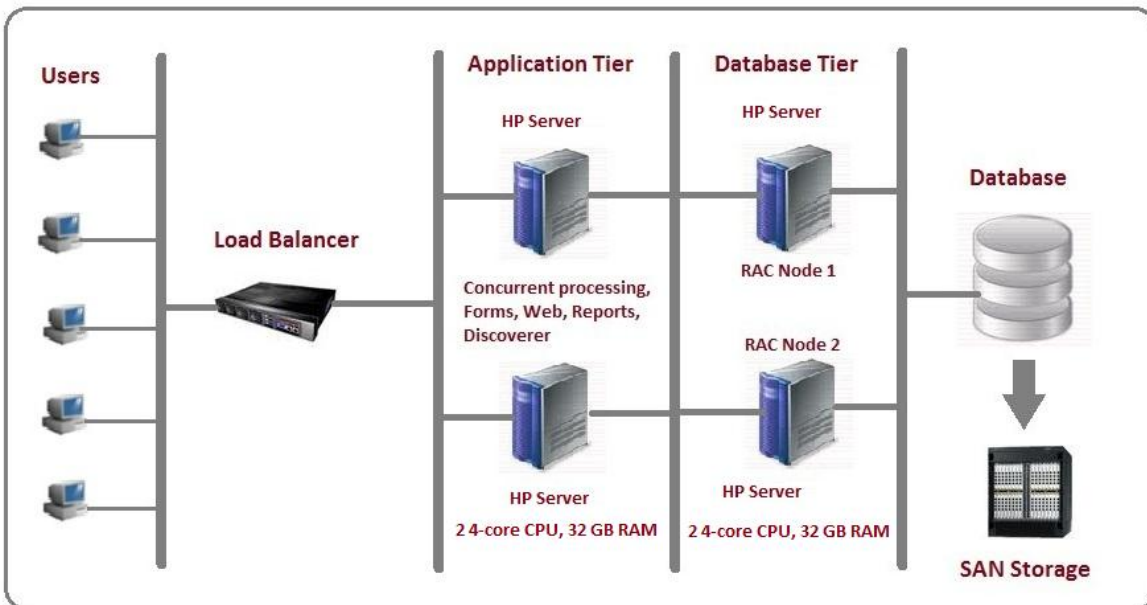
OROMIA BoFED BACKUP DATA CENTER ENVIRONMENT
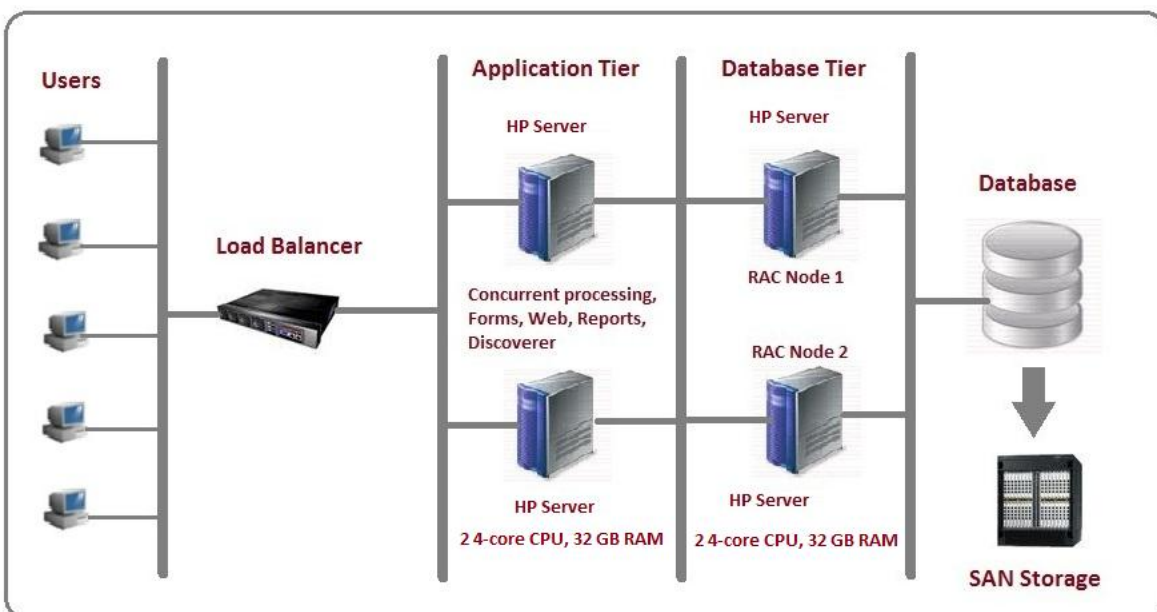
SNRRP Primary Data Center Environment
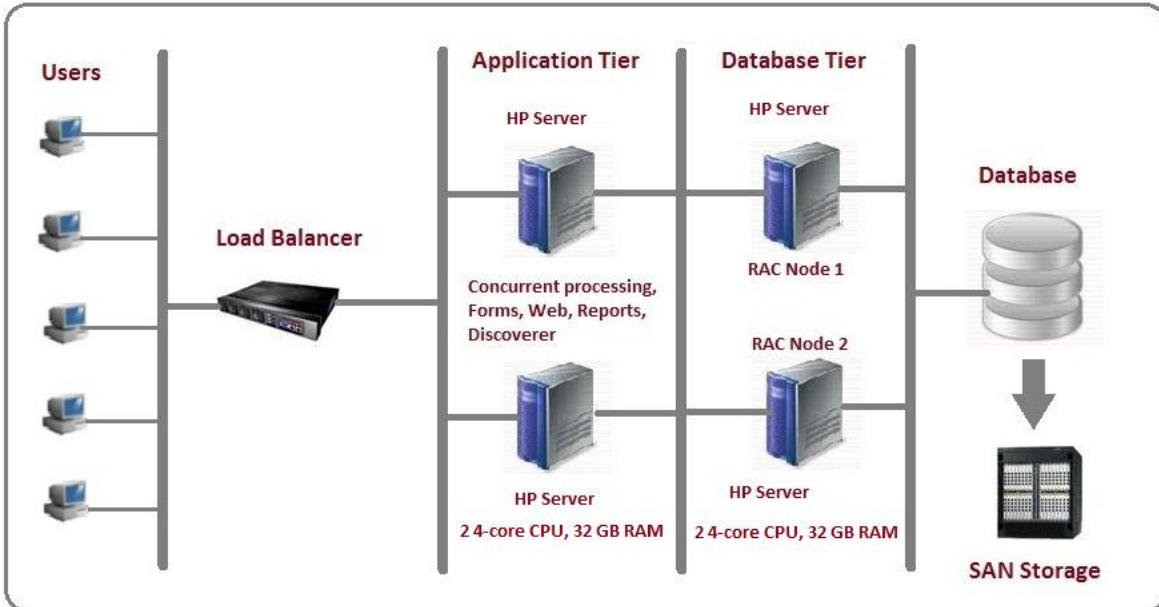
SNNPR BoFED Backup Data Center Environment
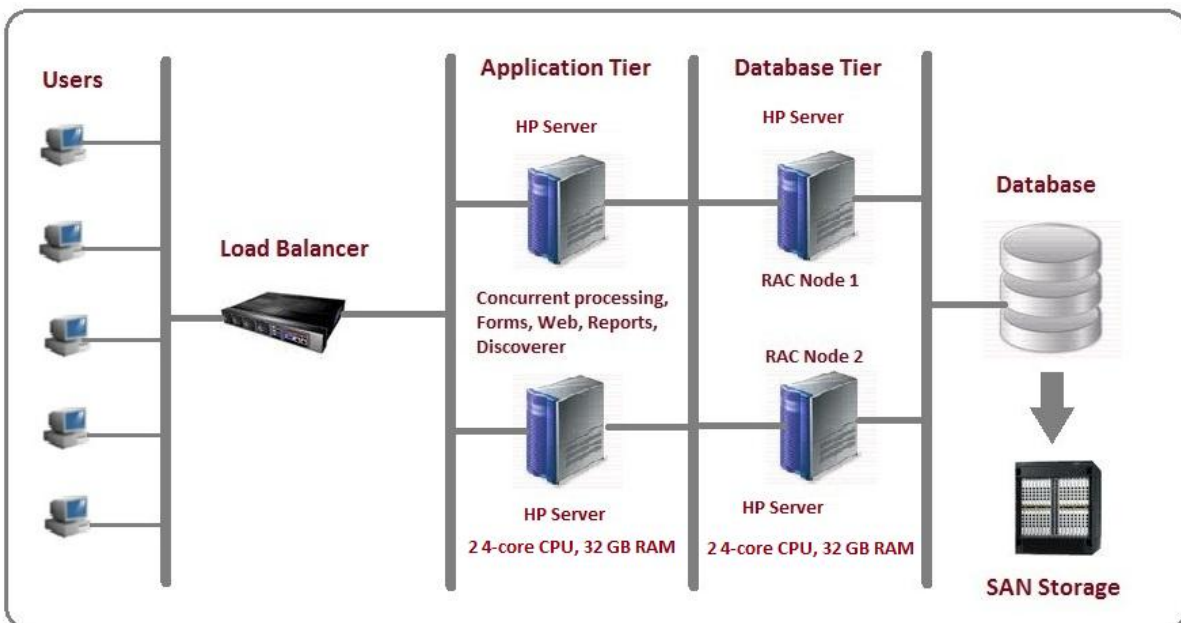
Hardware Configurations

SERVER SPECIFICATION

Given below is the specification of hardware and the configurations that are to be deployed according to the proposed architectures of various data centers.

Hardware Type	Deployment	Configuration
Data Base Server (Primary)	NDC	4 6-core 2.0 GHZ CPU, 64GB RAM
Application Server (Primary)	NDC	2 8-core 2.0 GHZ CPU, 64 GB RAM
Application Load Balancer (Primary)	NDC	2 4-core 2.0 GHZ CPU, 8 GB RAM
Data Base Server (Secondary)	MoFED	2 8-core 2.0 GHZ CPU, 64 GB RAM
Application Server (Secondary)	MoFED	2 8-core 2.0 GHZ CPU, 64 GB RAM
Application Load Balancer (Secondary)	MoFED	2 4-core 2.0 GHZ CPU, 8 GB RAM
Data Base Server (Regional Primary)	ORDC	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Server (Regional Primary)	ORDC	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Load Balancer (Regional Primary)	ORDC	2 4-core 2.0 GHZ CPU, 8 GB RAM
Data Base Server (Regional Secondary)	OBoFED	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Server (Regional Secondary)	OBoFED	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Load Balancer (Regional Secondary)	OBoFED	2 4-core 2.0 GHZ CPU, 8 GB RAM
Data Base Server (Regional Primary)	SRDC	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Server (Regional Primary)	SRDC	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Load Balancer (regional Primary)	SRDC	2 4-core 2.0 GHZ CPU, 8 GB RAM
Data Base Server (Regional Secondary)	SBoFED	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Server (Regional Secondary)	SBoFED	2 4-core 2.0 GHZ CPU, 32 GB RAM
Application Load Balancer (Regional Secondary)	SBoFED	2 4-core 2.0 GHZ CPU, 8 GB RAM

STORAGE SUBSYSTEM

The data for the IFMIS system needs to be stored on a high performing, redundant, and fault tolerant system that is compatible with transactional systems. All critical components of the

storage system need to have redundancy with a fail over ability. The system should support hot swap of redundant components and should come with feature rich managing software. Additionally, it needs to be highly scalable with support for tiered storage.

Oracle RAC implementation requires the use of several raw devices to ensure the disk subsystem operates optimally and efficiently, the storage arrays for the primary and secondary databases are configured with 21 300GB disks with 15K RPM. A third array consisting of 21 600GB drives with 15K RPM is recommended for the MoFED data center.

SOFTWARE SPECIFICATION

The software components that remain to be installed in the IFMIS servers are listed below:

Operating System	Oracle Enterprise Linux 5
E-Business Suite	Oracle EBS R12
Oracle Database	Oracle 11 Release2
Data Conversion	Not identified
Load Test scripts	Not identified

PSB Budget Creation Process Screenshots

- Define Global Account Sets for any new Budget Groups
- Navigation Path – Setup, Options, Account/Position Sets
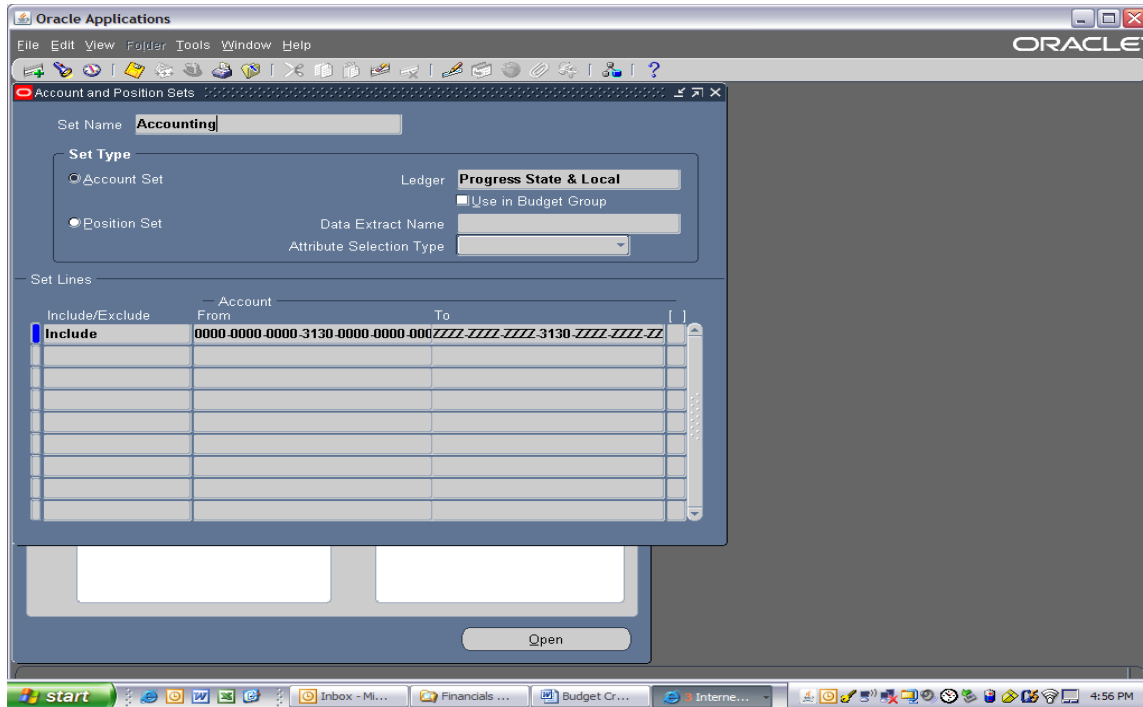
- Add any new Budget Groups
- Navigation Path – Setup, Budget Hierarchy, Budget Groups
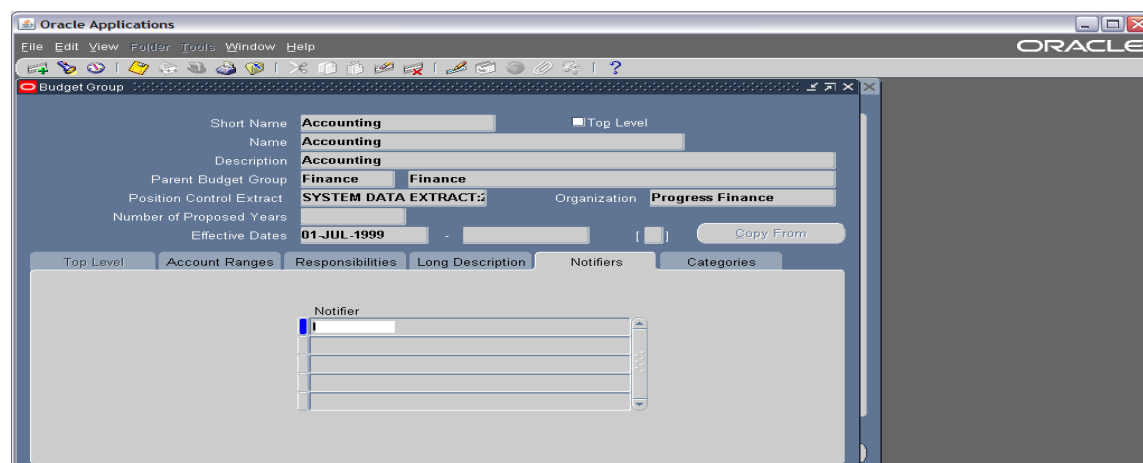
- Run Data Extract from Human Resources
- Navigation Path – Setup, Position, Extract

- Review the extracted Positions after the Data Extract is complete.
- Navigation Path – Position, Positions
- Press Control F11 to execute query and view all positions

- Define Position Sets for the extract.
- Navigation Path – Setup, Options, Account/Position Sets
- Place cursor in Set Name field and run Position Sets data load.

- Define Non-Salary (Benefits) Elements for the extract
- Navigation Path – Position, Elements
- Use Elements data load.

- Click on the Account Distributions button
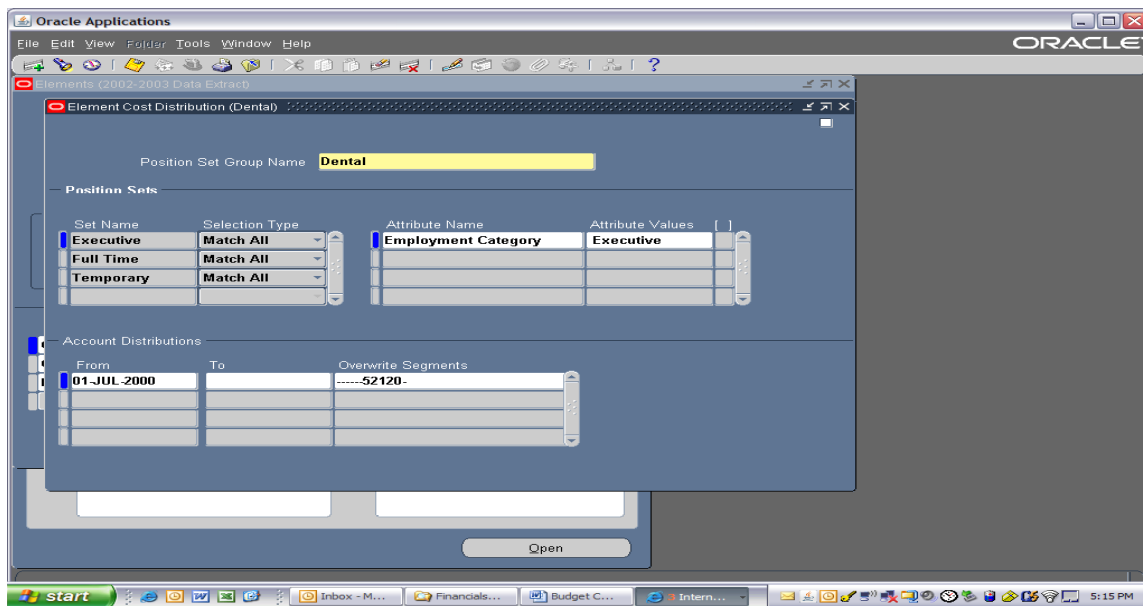
- Define Default Set Rules related to Elements
- Navigation Path – Position, Default Rule Sets

- Click on the Apply Rules button on the previous screen to run the Assign Position Defaults program.
- After the Assign Position Defaults program completes, review the Data Extract for accuracy of Non-Position (Benefits) Elements.
- Create Parameter Set for budget worksheet.
- Navigation Path – Worksheet, Parameters

- Click on the Formulas button

- Define the Budget Worksheet
- Navigation Path – Worksheet, Define
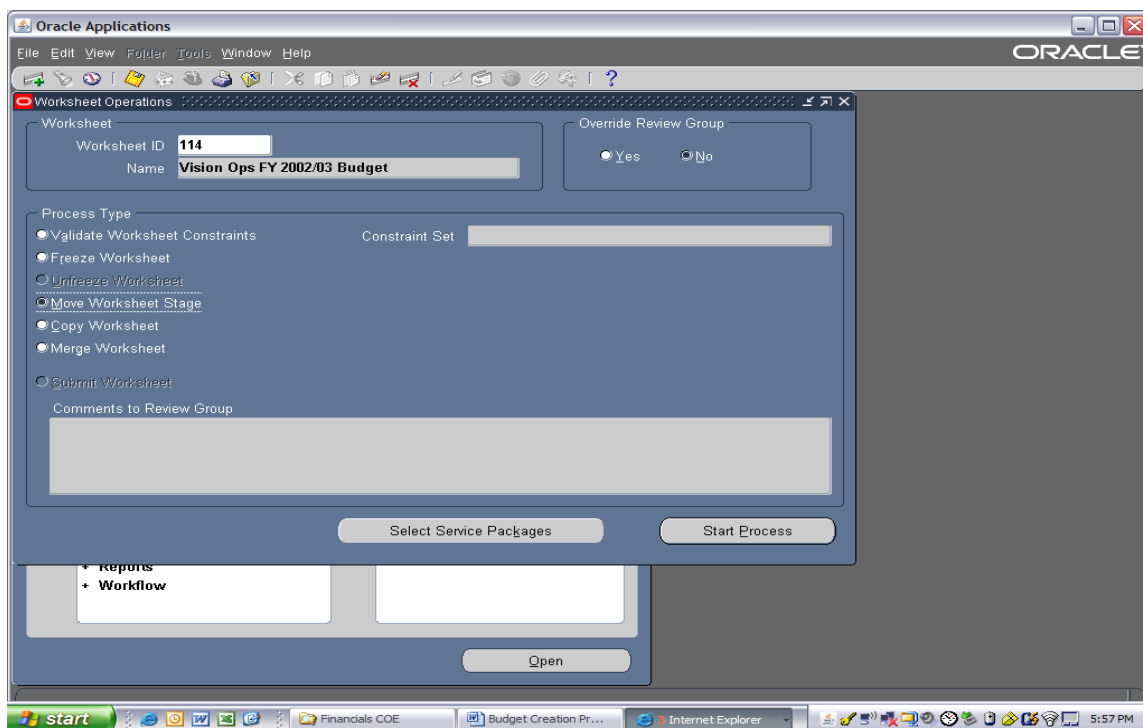
- Save the Budget Worksheet
- Click on Create Worksheet button to start the process.
- This budget worksheet creation process will fail if all positions do not have full costing and salary elements.
- Distribute Worksheet to department users
- Navigation Path – Worksheet, Distribute
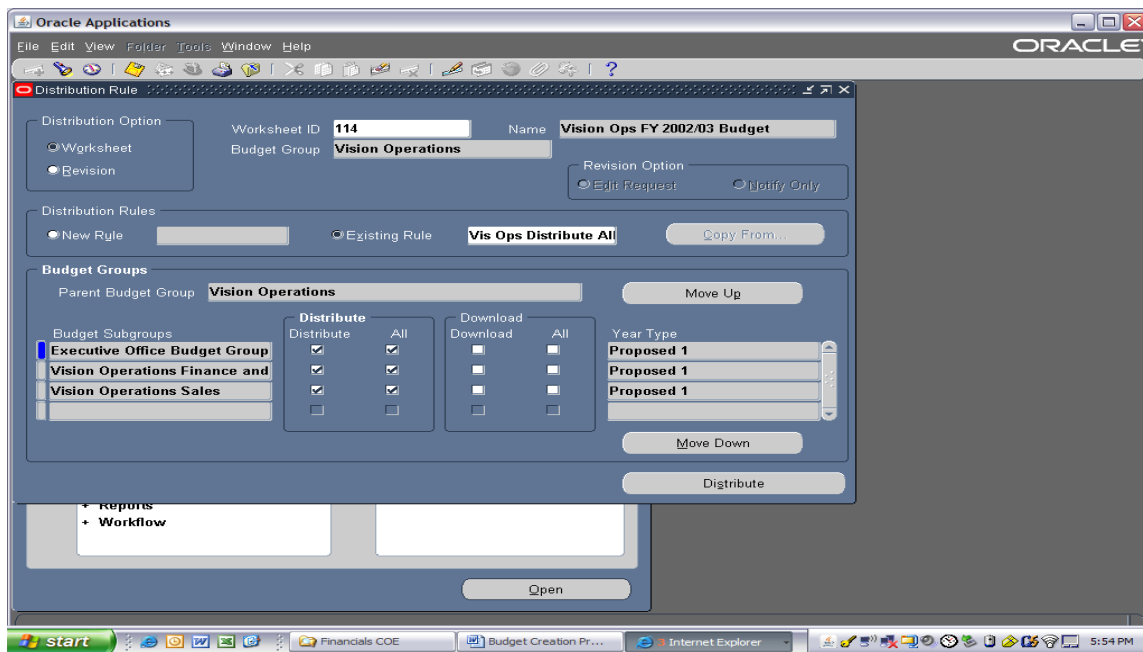
- Move Worksheet to next approval stage
- Navigation Path – Worksheet, Operations

ETHIOPIA IFMIS ASSESSMENT SCOPE OF WORK

On July 4, 2011 USAID deployed a three person short term Oracle IFMIS evaluation team comprised of one USAID temporarily assigned team member and two technology consultants to measure Ethiopia's implementation effectiveness in terms of adequate planning and design, stakeholder alignment, communications, and organizational capacity to successfully achieve a complex technology enabled transformation. Following our nine day in-country assessment based on stakeholder engagement and review of project artifacts, this report leverages our experience and methodology with the evaluation team's observations and analysis. Our short term evaluation team adhered to the following schedule:

- 3 days US based assessment coordination, planning and desktop research
- 9 days Ethiopia based stakeholder engagement, artifact review, and contextual observations
- 3 days US based report authoring and completion of final deliverable based on our Enterprise Value Delivery for Oracle

Enterprise Value Delivery (EVD) for Oracle is a proven implementation method that presents a collection of work products and guidance, including deliverable templates, sample deliverables, and accelerators organized by project, phase and discipline. Our tools are based on mature, well-tested processes and provide the foundation for delivering consistent, high-quality results for our clients. It is through this EVD lens that our team of two short term technology practitioners will evaluate the current state of Ethiopia's Oracle implementation. It is equally important to note that our team has extensive experience with technology in a development context.

EVD helps a project focus on value and results, manage risks, and maintain the project schedule and budget. EVD for Oracle is a proven and reliable implementation methodology that can be used as a diagnostic tool to measure Ethiopia's implementation effectiveness to achieve a complex technology enabled transformation.

Our experience with Oracle implementations reveals a dramatic shift in how organizations build functionality and capabilities into enabling platforms. Rather than emphasizing the power of the technology being implemented, organizations now prefer to emphasize how stakeholders are enabled by the technology. This approach is critical to successful implementation/transformation efforts because it builds the platform stakeholders need to realize project benefits and achieve the necessary government controls. This report aims to furnish USAID key technical insights so the Mission can make well informed data driven decisions.

Key benefits of our EVD methods include:

EVD goes beyond project management to focus on business value. More specifically, the EVD approach focuses on areas that matter most to the Government of Ethiopia which include implementation of an integrated, affordable, capable, and sustainable system. Approaches and aims that are well suited for high functioning multinational corporations are often a poor fit for nascent governments with limited human capacity and organizational maturity.

EVD links business value to the service delivery and enterprise design. EVD links the components of the solution (process, people, and technology) to clear and measurable goals. Our assessment will help uncover and identify Ethiopia's value targets from the business case perspective and we will attempt to validate if these aims and objectives are reflected in the current Oracle implementation.

EVD transforms the definition of success. EVD focuses on realizing the project benefits as identified in the business case, as well as delivering on time and on budget. This perspective will help USAID and the US Mission Ethiopia determine the appropriateness and value of potential investments.

- EVD emphasizes change management and knowledge transfer. The importance of change management and knowledge transfer to the adoption of a new Government of Ethiopia system is paramount to a successful implementation. EVD's emphasis on these critical components will help determine Ethiopia's readiness and identify necessary organizational changes that need to occur.

- EVD emphasizes excellence through quality and risk management. Embedded in all of our analysis is risk and quality. Integrity and transparency are necessary preconditions to successfully deliver complex technology enabled transformations. Dependent upon the extent of documentation furnished by the Government of Ethiopia we will strive to identify potential risk and quality issues such as technical "blind spots", unconventional or high risk approaches, and possible "red flag" indicators so USAID is technically informed to the greatest extent possible to help avoid implementation surprises or misaligned expectations.